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## 28. X-Ray Studies on the Reaction between Polyvinyl Alcohol and Borax

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In contrast to the reaction between aqueous solution of polyvinyl alcohol and boric acid no precipitation but only gelation was observed in the case with PVA and borax. When polyvinyl alcohol film is immersed in solution of borax of various concentrations, swelling of the film increases with increasing concentration of the borax solution, and dissolution of the film takes place in 10% solution. The swollen film may be elongated to several times of its initial length and a new fiber diagram of a complex compound between polyvinyl alcohol and borax is obtained after air drying of the stretched films.

The spacing and intensity of the main interferences are given below :

Interference	A <sub>1</sub>	A <sub>2</sub>	A <sub>4</sub>	A <sub>5</sub>	I <sub>0</sub>	II <sub>0</sub>	III <sub>1</sub>	III <sub>2</sub>
Intensity	s.	m.s.	v.s.	m.w.	s.	s.	m.w.	s.
spacing d in Å	18.0	8.83	4.40	3.63	7.43	3.70	2.40	2.17

From the above data a rhombic unit cell of the following dimensions may be assumed :

$$a = 18.0\text{\AA}, \quad b \text{ (fiber axis)} = 7.43\text{\AA}, \quad c = 10.0\text{\AA}.$$

## 29. Deformalization of Vinyon

### Estimation of the Degree of Polymerization of Vinyon

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It is rather difficult to determine the degree of polymerization of partially polymerized polyvinyl alcohol in vinyon by the viscosimetric method, for the lack of good solvent for it. When vinyon is deformalized in an aqueous medium with sulfuric acid, formaldehyde is removed through steam distillation and sulfuric acid through dialysis. An aqueous solution of polyvinyl alcohol can thus be obtained. With this solution, degree of polymerization may easily be determined by the viscosimetric method. It was found that the regenerated polyvinyl alcohol had essentially the same degree of polymerization as that of the initial polyvinyl alcohol used for the preparation of the fiber.

This method may serve for the study of the change of P. D. of vinyon by weathering, exposure to light and so on.